

Public Shared Mobility and the Platform Economy: Competing Models of Bicycle Sharing Infrastructure in Austin, Philadelphia, and the San Francisco Bay Area

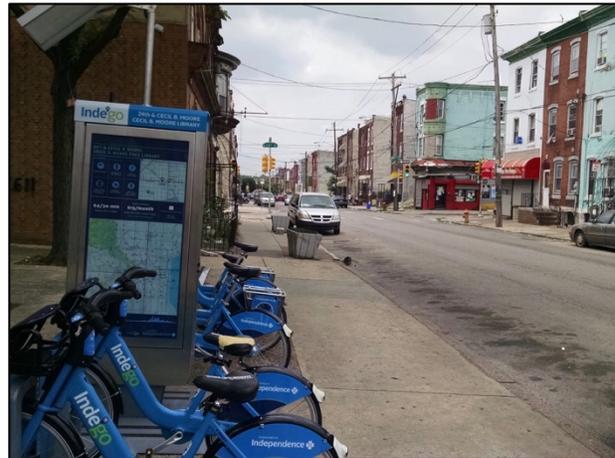
Final report for National Science Foundation Award #1734665 | February 2020

John G. Stehlin ✉

Assistant Professor, Department of Geography, Environment, and Sustainability
University of North Carolina at Greensboro

Will Payne

PhD Candidate, Department of Geography
University of California, Berkeley



Contrasts between bikeshare stations in the central core and outer neighborhoods: B-Cycle station in Austin's Seaholm district (L) and Indego station at the Cecil B. Moore Branch of the Free Library of Philadelphia, North Philadelphia, now removed (R). Photos by John Stehlin.

Introduction

Over the past decade, public bicycle sharing (or “bikeshare”) systems have captured the attention of urban planners and policymakers across the globe.¹ These systems consist of public bicycle fleets organized in a network of docking stations with automated kiosks and launched by public-private partnerships between city governments, bikeshare operators, and corporate sponsors. By the mid-2010s, these services, modeled on Paris and Barcelona’s pioneering approaches, had been adopted by cities ranging from New York to Mexico City to Spartanburg, South Carolina. Bikeshare addresses several urban issues simultaneously: it is an inexpensive way to encourage active transportation, increase access to mass transit, reduce traffic congestion and carbon emissions, and promote economic development and inter-urban competitiveness.

In the United States, however, these systems have struggled to expand beyond their disproportionately white and middle-class user base.² The Better Bike Share Partnership (BBSP) was formed in 2014 by the JPB Foundation, the National Association of City Transportation Officials (NACTO), the PeopleforBikes Foundation, the City of Philadelphia, and the Bicycle Coalition of Greater Philadelphia (BCGP) to develop inclusion strategies and overcome barriers to low income users, especially people of color. Over the five years of its activities, the BBSP made important strides toward developing best practices for more racially and economically inclusionary bikeshare systems. But limitations persist. Studies have found that lack of information about low-income programs and perceptions of danger due to lack of bicycle infrastructure deter underserved residents.³

Our research highlights more structural issues. We examine the way that funding constraints largely limit bikeshare system coverage to central business districts and adjacent gentrifying neighborhoods, places that are often already well-served by public transit, while lower-income neighborhoods of color in need of improved transit options often fall beyond the service area. Furthermore, by 2018, bikeshare began to face intense competition from newer, “dockless” systems, which use smartphone apps and GPS-enabled bicycles and/or scooters to bypass both the station network and the need to partner with local governments. Dockless systems also claim to more efficiently serve neighborhoods excluded from station-based systems because of their lower capital costs. This research, conducted at the height of the conflict between these infrastructure models, yielded valuable scholarly insights into the evolution of urban mobility infrastructure as well as policy-relevant observations about the public sector’s role in addressing shortcomings in equitable service provision.

Methods

This research combined qualitative methods such as key informant interviews, participant observation, and archival analysis with descriptive statistics and geographic information science (GIS) mapping. The PI (John Stehlin) conducted fieldwork between January 2018 and July 2019, with extended visits to Austin, Philadelphia, and the San Francisco Bay Area as well as shorter trips to Portland, Oregon and New York City.

Interviews. Interviews were conducted with roughly 75 public and private sector bikeshare planners, consultants, managers, and community outreach coordinators, as well as representatives of bicycle advocacy organizations and other relevant stakeholders.

Field observation. In each city, the PI documented the surroundings of bikeshare stations, including proximity to businesses, new housing developments, institutions, parks, and transportation infrastructure. In Austin, in April and May 2018, the PI also conducted

observation of public events and legislative meetings where debates over the permitting of “dockless” platforms occurred.

GIS and descriptive statistics. The research assistant (Will Payne) conducted GIS analysis of recent changes in the demographic and economic characteristics of neighborhoods included in bikeshare service areas, and of changing usage rates between station-based and “dockless” services in Austin.

Findings

Our study identifies several key elements that contribute to the concentration of bikeshare systems and usage in central business districts and gentrifying residential areas (see **Figures 1-3**). The first is a feasibility study. Feasibility studies, typically conducted by outside consulting firms, use a variety of factors to estimate the most suitable areas for bikeshare service, including: population density; commercial, institutional, and employment destinations; existing mass transit and bicycle infrastructure; household income; and topography. In discussions with consultants, population density was considered the most important of these factors. Consequently, these studies tend to recommend a service area focused on downtown cores and their surroundings to maximize efficiency and revenue generation. However, they also include more “subjective” considerations as well, such as a goal of serving particular favorable sites, avoiding political opposition, or promoting greater inclusion. We found that promoting inclusion is a high priority among consulting firms, system managers, and public officials but, with limited station budgets, the “best” market areas received priority, since they were the precondition for the system to function altogether.

This points to the importance of a second element: how underlying patterns of urban development affect system organization and usage. GIS data show that bikeshare systems tend to serve neighborhoods undergoing both residential and commercial gentrification, which (often) comes with an increase in density of population and destinations. Stations in less dense, lower-income neighborhoods with fewer jobs and destinations generate less revenue and see lower rates of usage, especially when at the edge of the bikeshare system, and can be vulnerable to service cuts if they do not perform well. Placing stations in these areas serves equity goals but increases costs and financial risks, creating a conflict between equity initiatives and financial sustainability requirements. Each system has a community outreach program that offers “people-based” equity programs, such as discounted memberships to low-income users, but few have “place-based” equivalents that support stations in less “feasible” locations. People-based programs have the benefit of not committing systems to funding and operating low-revenue stations, but may not be as effective at promoting accessibility if low-income areas go underserved.

Philadelphia. Philadelphia was a founding partner of the BBSP and has served as a proving ground for equitable bikeshare. In addition to conducting outreach among marginalized users (funded by the BBSP), only Philadelphia has used additional philanthropic funding from local foundations to add stations specifically in low-income neighborhoods. System managers held different performance expectations for these stations and tolerated low rates of usage in the interest of equity, but had no long-term dedicated funding to support their operation. Thus, in the long run, expansion into underserved areas has had to be balanced against densification in the strongest markets, and this is negotiated with the City's Office of Transportation and Infrastructure Systems, the ultimate authority on system organization.

Austin. The delicate balance between equity and financial sustainability was most evident in the case of Austin, which had neither a large title sponsor like the San Francisco Bay Area and Philadelphia nor philanthropic support like Philadelphia. In Austin, managers said they saw stations in lower-income areas go from loss-making to revenue-generating as gentrification progressed, while at the same time they lacked the resources to push beyond these areas to serve low-income neighborhoods that are not yet gentrifying. To a degree, because it operated at nearly 100% "farebox recovery," Austin's system's managers depended on the increasing densities associated with gentrification in order to justify system expansion, while at the same time active construction often temporarily displaced bikeshare stations themselves.

Oakland. In Oakland, city planners pressured the bikeshare provider to extend service into some low-income neighborhoods of color in East Oakland but lacked capacity to further expand coverage due to the private ownership of the system. Although in East Oakland there are large low-income housing developments proximate to mass transit which could in principle provide the requisite density for bikeshare, and a large cluster of jobs nearby at the Oakland International Airport, these areas were not considered for inclusion in the service area because of their distance from the urban core. Public funding exists to add stations in *cities* that are not currently served by the system, but not underserved neighborhoods *within cities* like Oakland that already have stations.

A third, broader issue that affects the capacity to serve lower-income residents is the shift in the "sharing economy" toward dockless bike and scooter services. Bike- and scooter-sharing startups have received massive amounts of venture capital funding, and some have been acquired outright by venture-funded companies like Uber and Lyft as part of their app-based mobility "ecosystems." Dockless systems, which are lower in cost, faster to launch, and more locationally flexible, have placed enormous pressure on station-based bikeshare. The dockless model does not require complicated public-private partnership arrangements, feasibility studies, or community outreach, and rather than needing to piece together funding for equipment, cities

now find companies providing their services seemingly at no up-front cost. The trade-off, however, is much more limited transparency, accountability, and in some cases longevity.

Most importantly from a geographical perspective, the limitations of the station-based model detailed above—principally lack of funding to expand beyond the urban core—leave these systems politically exposed to dockless companies who can claim to serve the city more equitably, though the evidence in this regard is inconclusive.⁴ In Austin, after a contentious process, the city created permitting requirements for dockless firms in May 2018, and they quickly eroded the station-based system's market share.⁵ In short, the city undermined the performance of its own capital assets. Concerns about this dynamic have slowed the process of dockless implementation in Philadelphia, while in the San Francisco Bay Area, the station-based system, which is now owned by Lyft and branded Bay Wheels, enjoys a contractual monopoly over providing bikeshare services. This insulation from competition, coupled with a massive cash infusion from Lyft's purchase, has not led Bay Wheels to expand further into East Oakland, but instead it has rolled out e-assist bikes as well as dockless offerings in San Francisco and San Jose. Thus, the lack of tools for public governance of bikeshare systems limits their geographic equity, even when under-investment is not the problem.

Public impact

We hope that this research contributes to improving funding for station-based bikeshare systems, and particularly for investing more holistically in *outreach*, *operations*, and *equipment*. The BBSP focused on initiatives to improve access for underserved communities through better outreach and operations design, while BBSP partner NACTO has developed best practices for station placement. Philadelphia is an excellent example of a city that combined municipal capital investment, more equitable station placement, and dedicated and empowering outreach, which resulted in a dramatic increase in ridership among African American residents. We see the city's proactive role and "skin in the game" as a key aspect of this success. One of the greatest barriers to such equity initiatives, however, is the overall lack of ongoing funding for operations. In many smaller cities, bikeshare systems are launched with federal capital grants, but these sources are inconsistent, and do not support operational costs. The Bikeshare Transit Act of 2019, sponsored by Rep. Earl Blumenauer (D-Ore.), is currently before the Highways and Transit subcommittee of the House of Representatives, where several previous versions have died.⁶ Furthermore, the viability of the federal funding model is threatened by the availability of dockless alternatives, even if they offer fewer mechanisms for achieving public policy goals. This research demonstrates the positive impacts of better funding for station placement in underserved neighborhoods and concerted outreach, as well as proactive planning and responsive public oversight, which this Act would support if passed. It also shows the political obstacles that face such systems at a time of rapid technological and organizational change.

Scholarly impact

This project contributes to research agendas in geography, urban studies, urban planning, and science and technology studies on ongoing infrastructural change in American cities. First, it theorizes an emerging *scale* of infrastructure provision—the sub-municipal urban core—that bikeshare systems, as well as other emerging mobility technologies, produce as a function of how they are funded, planned, and operated. In this way, bikeshare systems represent a new form of “already-splintered” urban infrastructure.⁷ At the same time, their relative low cost and flexibility as infrastructure enables planners, civic institutions, funders, and advocacy groups to shape them—within budget constraints—into somewhat more equitable systems, provided that there is support for such activities.⁸ This research also builds on an expanding research agenda on “platform urbanism” by demonstrating the economic, regulatory, and spatial tensions between public-private partnership models of bikeshare and venture capital-funded dockless systems.⁹ Finally, it contributes to a rapidly growing literature on the political, economic, and social dimensions of bicycling and bicycle infrastructure investment.¹⁰

Project Details

Funding: National Science Foundation Science, Technology, and Society Program
Award: [1734665](#)
Title: Scholars Award: US Public-Private Partnerships in Bicycle Sharing Systems
Recipient: Department of Geography, University of California, Berkeley
Duration: 8/1/2017 – 7/31/2019
Contact: Dr. John Stehlin
Assistant Professor, Department of Geography, Environment, and Sustainability
University of North Carolina, Greensboro
jgstehli@uncg.edu
[@jstehlin](#)

Personnel: Dr. John Stehlin
NSF Scholar, Geography, University of California, Berkeley
PI, 8/1/2017 – 7/31/2018; Co-PI, 8/1/2018 – 7/31/2019

Dr. Robert Rhew
Chair, Geography, University of California, Berkeley
PI, 8/1/2018 – 7/31/2019

Will Payne
PhD Candidate, Geography, University of California, Berkeley
Research assistant, 8/1/2018 – 7/31/2019

Figure 1. Bikeshare system usage rates and population density. Map by Will Payne.

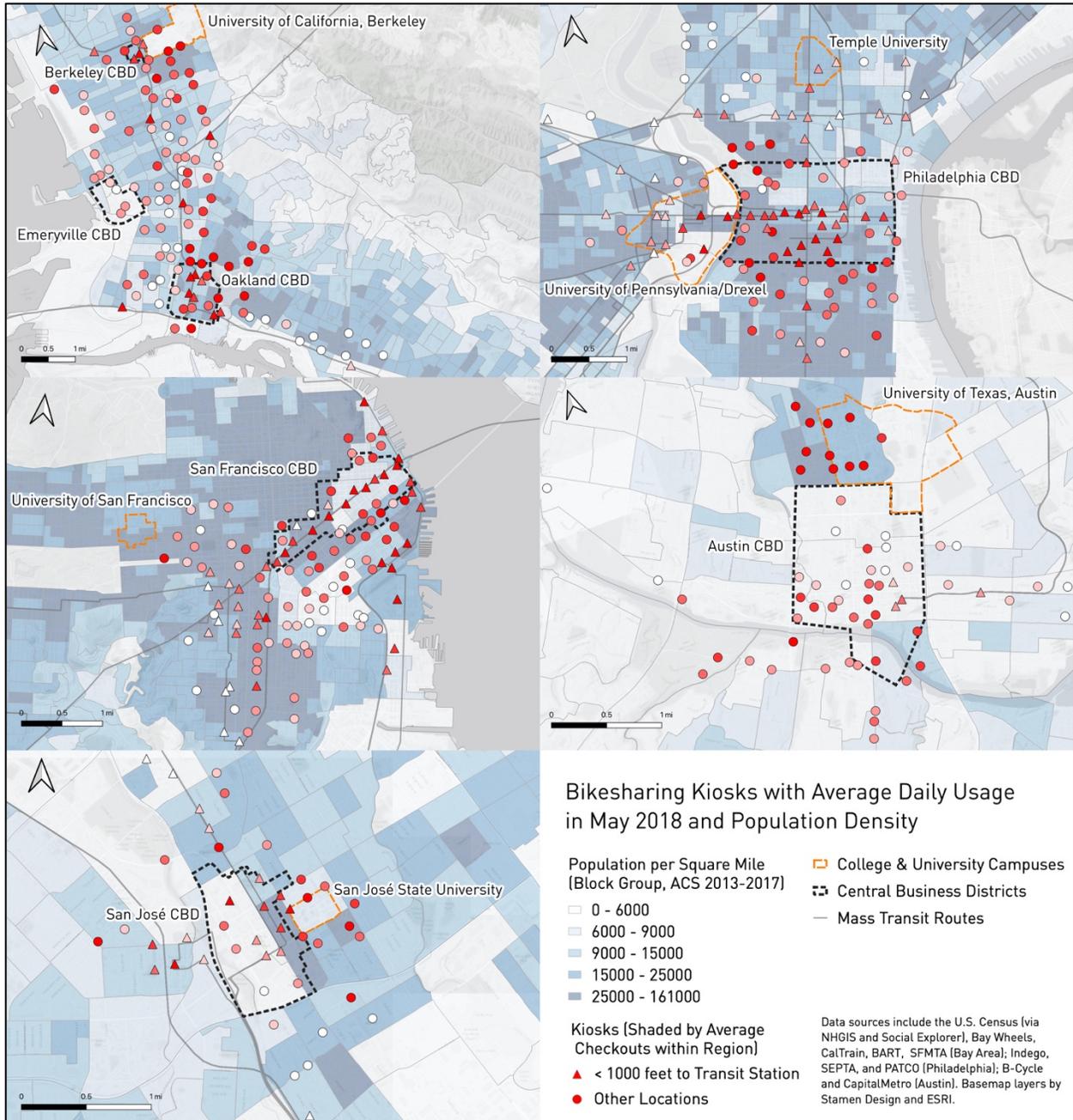


Figure 2. Bikeshare system kiosk locations, median household income, and rate of household income change. Map by Will Payne.

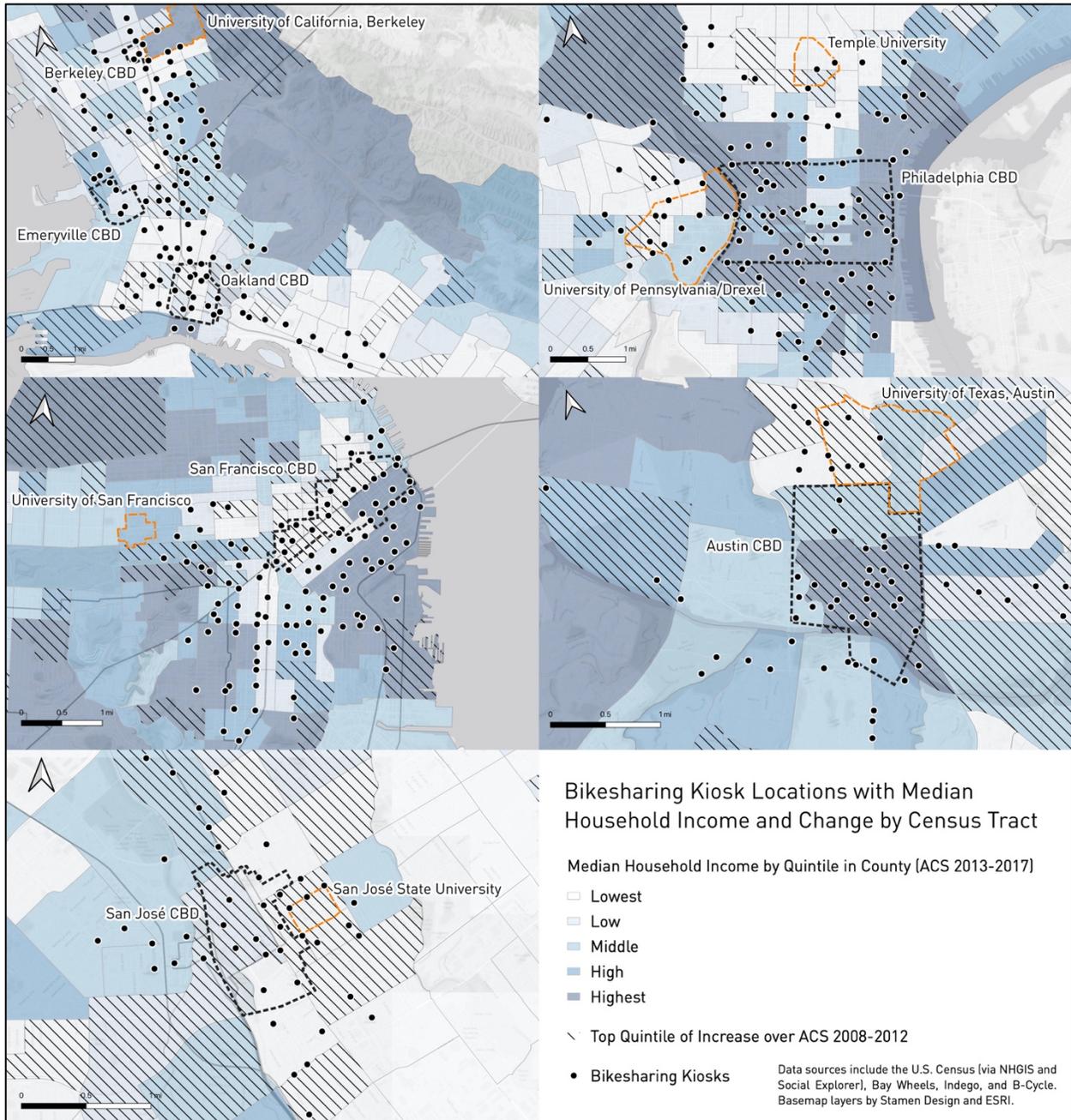
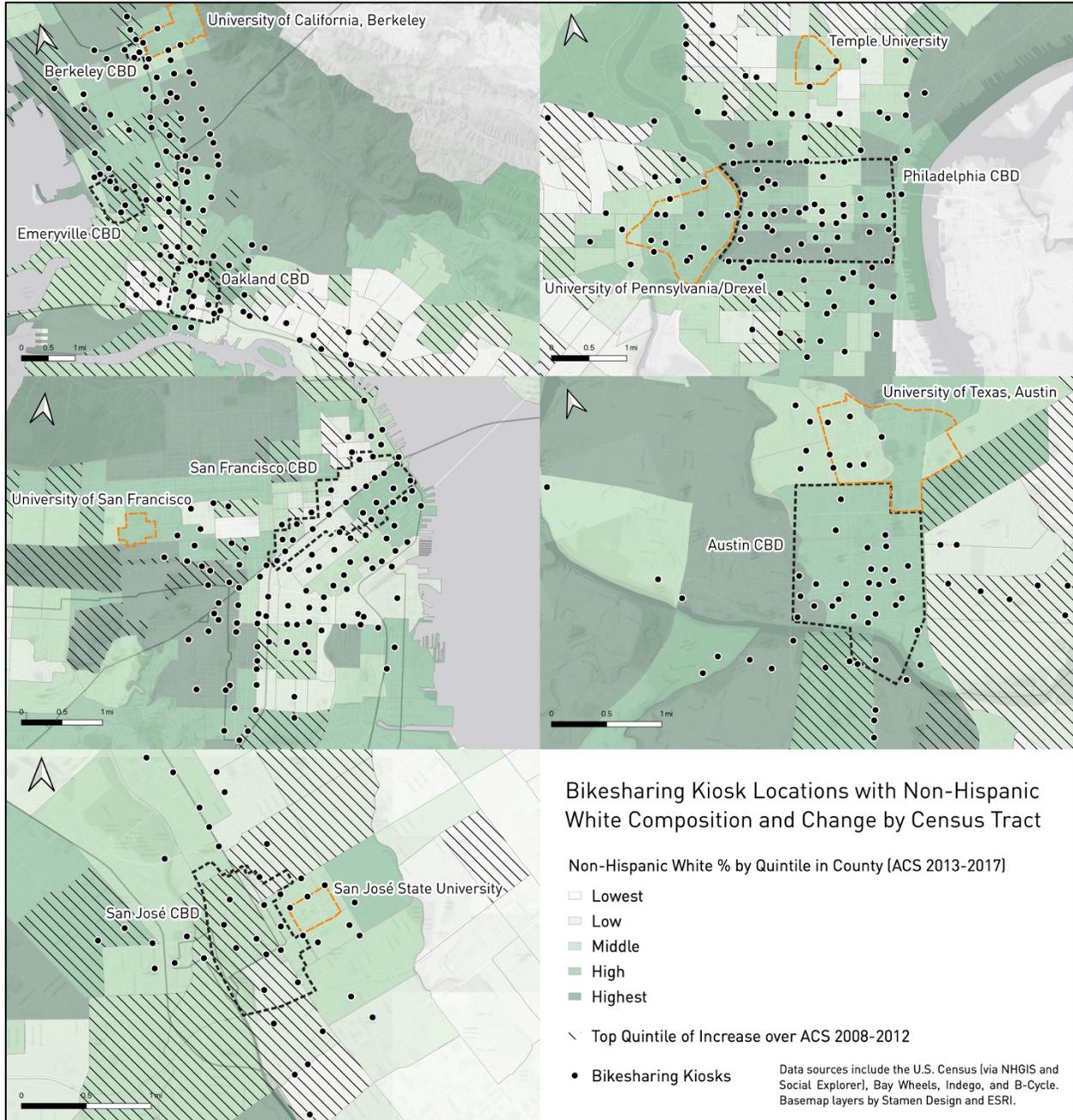


Figure 3. Bikeshare system kiosk locations, non-Hispanic white population, and rate of demographic change. Map by Will Payne.



Notes

- ¹ Susan A. Shaheen, Stacey Guzman, and Hua Zhang, “Bikesharing in Europe, the Americas, and Asia,” *Transportation Research Record: Journal of the Transportation Research Board* 2143 (2010): 159–167.
- ² Benjamin Schneider, “What Keeps Bike Share White,” *CityLab*, July 14, 2017, <https://www.citylab.com/equity/2017/07/what-keeps-bike-share-white/533412/>.
- ³ Nathan McNeil et al., “Breaking Barriers to Bike Share: Insights from Residents of Traditionally Underserved Neighborhoods” (Portland, OR: Portland State University Transportation Research and Education Center, 2017), https://pdxscholar.library.pdx.edu/trec_reports/138/.
- ⁴ Stephen J. Mooney et al., “Freedom from the Station: Spatial Equity in Access to Dockless Bike Share,” *Journal of Transport Geography* 74 (January 1, 2019): 91–96, <https://doi.org/10.1016/j.jtrangeo.2018.11.009>.
- ⁵ Paul Cobler, “Austin’s B-Cycle Was Riding High. Then Scooters Came to Town.,” *Austin American-Statesman*, November 20, 2018, <https://www.statesman.com/news/20181120/austins-b-cycle-was-riding-high-then-scooters-came-to-town>.
- ⁶ Rep. Earl Blumenauer, “H.R.4001: Bikeshare Transit Act of 2019,” Pub. L. No. 4001 (2019), <https://www.congress.gov/bill/116th-congress/house-bill/4001>.
- ⁷ Steven Graham and Simon Marvin, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition* (New York: Routledge, 2001).
- ⁸ Donald MacKenzie and Judy Wajcman, “Introductory Essay: The Social Shaping of Technology,” in *The Social Shaping of Technology*, ed. Donald MacKenzie and Judy Wajcman (Buckingham, UK: The Open University Press, 1999), 3–27.
- ⁹ Sarah Barns et al., “Digital Infrastructures and Urban Governance,” *Urban Policy and Research* 35, no. 1 (2017): 20–31, <https://doi.org/10.1080/08111146.2016.1235032>; John Stehlin, Michael Hodson, and Andrew McMeekin, “Platform Mobilities and the Production of Urban Space: Toward a Typology of Platformization Trajectories,” *Environment and Planning A: Economy and Space*, 2020, <https://doi.org/10.1177/0308518X19896801>.
- ¹⁰ Aaron Golub et al., *Bicycle Justice and Urban Transformation: Biking for All?* (London and New York: Routledge Earthscan, 2016); John G. Stehlin, *Cyclescapes of the Unequal City: Bicycle Infrastructure and Uneven Development* (Minneapolis, MN: University of Minnesota Press, 2019).